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ABSTRACT

Inter-organizational cooperation was investigated as one factor associated with the development of the University of New Mexico from an undergraduate teaching institution toward becoming a nationally-ranked graduate research university. A longitudinal, ethnohistorical study was undertaken for the 1967-1978 period. The qualitative research methodology involved an extensive review of institutional documents and informal interviews with key university administrators. Attention was directed to the creation of the Office of the Vice President for Research as a means of promoting and supporting campus research. The findings suggest that inter-organizational cooperation enabled institutional leaders to adapt to shifts in the external research support environment and the increased level of competition for research funds. The level of inter-organizational cooperation increased as the level of resource uncertainty and competition increased, moving from mutual adjustment to alliance and to corporate forms of relationships. This cooperation decreased as those conditions were ameliorated. Theoretical propositions concerning inter-organizational cooperation in developing research universities are identified. The development of grounded theory in general is also briefly addressed. (Author/SW)

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COMPETITIVE RESEARCH ENVIRONMENT

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Invited Symposium
Environmental Change: Implications for
Emerging Research Universities

HE 018051

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ABSTRACT

INTER-ORGANIZATIONAL COOPERATION AND THE DEVELOPMENT OF A RESEARCH UNIVERSITY

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Inter-organizational cooperation, as a factor associated with the development of the University of New Mexico from an undergraduate teaching institution toward a nationally-ranked graduate research university, was identified in this longitudinal, 1967-1978, ethnohistorical study. The qualitative research methodology employed in this institutional study included an extensive examination of documents and informal interviews with university administrators. This study examines the creation of the Office of the Vice President for Research as a means of promoting and supporting campus research. The findings suggest that inter-organizational cooperation enabled institutional leaders to adapt to shifts in the external research support environment and the increased level of competition for research funds. The level of inter-organizational cooperation increased as the level of resource uncertainty and competition increased moving from mutual adjustment, to alliance and to corporate forms of relationships and decreased as those conditions were ameliorated. Inter-organizational cooperation was associated with the University's emergence as a nationally-ranked research institution.

Preface

The invited symposium: Environmental Change: Implications for Emerging Research Universities is composed of four papers entitled: (1) "The Implications of Structural Reorganization in an Emerging Research Institution," (2) "Cognitive Imaging and Organizational Change: The Social Dynamics of an Emerging Research University," (3) "Inter-organizational Cooperation in a Competitive Research Environment," and (4) "Environmental Uncertainty and External Resource Acquisition: Implications for a Developing Research University." These papers are based on the findings of one research effort directed toward investigating how an institution of higher education responded to changes in its research environment and developed from a teaching institution toward a nationally ranked graduate research university. These papers were prepared specifically to analyze distinct factors associated with institutional research development and, as such, to stand as critical and independent works. In consideration that these papers were based on the same research, sections of these papers and some of the data included in the descriptive narratives that impinged on the manner in which the institution responded to events, are the same. The symposium format provides an appropriate forum not only to discuss these factors but to synthesize the propositions in an effort to present a limited but grounded theory of developing research universities.

Introduction

The principal objective of this study has been to discover, examine, and explain inter-organizational cooperation as one factor associated with the development of the University of New Mexico from an undergraduate teaching institution in the direction of a nationally-ranked graduate research university. The University of New Mexico was selected as the unit of study because it was representative of a group of Rocky Mountain and High Plains universities that appeared to be engaged in similar developmental activities during a period of uncertainty about the federal government's commitment to university research support and provide a unique opportunity to study institutional development.

The data bearing on institutional development are briefly reported for two separate, sequential time periods. The initial sections of the descriptive narrative cover the internal modification of the organizational structure of this university, including the establishment of the Office of the Vice President for Research. Such adjustments also facilitated the University's attempts to secure external research support. The latter sections of the descriptive narrative covered the activities of the Office of the Vice President for Research focusing in particular on efforts to protect its research interests and to secure external research support funds. Both sets of organizational development activities were associated with the University's emergence as a nationally-ranked research institution.

Methodology

The dynamic process through which an institution of higher education responds to change in its external environment and develops

from an undergraduate teaching institution to a graduate research university is not well understood. The literature on institutional adaptation to external environmental change is essentially atheoretical in nature and contains little work designed to test theories describing the dynamics of the change process (Giaquinta, 1973, p. 170).

This study is directed toward developing a set of naturalistic generalizations and building theory rather than toward affirming a prevailing theory. The significance of discovering theory from data, the generation of "grounded theory" (Glaser and Strauss, 1967), lies in the researcher's ability to arrive at relevant "predictions, explanations, interpretations and applications" (p. 1) that are both empirically sound and singularly pertinent to the phenomenon under study.

This study focuses on a highly particular slice of the University's environment rather than comprehensively describing and analyzing an institution's responses to changes in its macro environment. It is limited to the University's research environment and presents only a piece of that larger story.

Rationale

The choice of research methodology was determined by the nature of the problem under investigation (Lofland, 1971; Schumacher, 1972). This study employed a methodology that recognized that the relationships and events experienced by participants occurring over time should be examined comprehensively and in their natural setting. Filstead (1979) has noted that an important characteristic of qualitative methodology allows the researcher to get close to the data, obtain first-hand knowledge and develop the "analytical, conceptual, and categorical components of explanation from the data

itself" (p. 33). Reality, meaning, and behavior were analyzed from the perspective of the subjects' interpretation of the world. Attention to the subjects' perspective allowed the researcher to obtain a rich contextual understanding of events and to obtain a powerful way to understand the phenomenon of leadership in organizational change. A field study approach provided a flexible means through which a university's inter-organizational cooperative efforts could be examined comprehensively (Babbie, 1979) and in context.

Data Collection

In utilizing qualitative research methodology for the study of organizations, it is important to employ a wide variety of data collection techniques to ensure the flexibility necessary to gathering relevant data (Glaser and Strauss, 1967) and to assuring the validity and reliability of the data. The nature of the phenomenon under study lent itself to using the ethnohistorical approach described by Schumacher (1972) and Smith (1978). This approach focuses on "the accumulation of evidence about events in the past and their subsequent interpretation by the participants as part of a larger phenomenon (Highie, 1981, p. 47). The ethnohistorian attempts to go beyond the official description of events and to include personal recollections, anecdotes, and quotations in an attempt to develop a vivid, provocatively-rich account of events. To accomplish this goal, a combination of qualitative research techniques commonly associated with the participant-observation approach (McCall and Simmons, 1969) was employed. By analyzing documents such as memoranda, desk logs, letters, written reports, minutes of board meetings, proposals, journal articles, newspaper accounts and press releases, explicit knowledge was obtained and organized into a longitudinal historical record that chronicled events during the "bounded" (Stake, 1978,

p. 7) period of time, 1967-1978, during which the University of New Mexico moved in the direction of a graduate research university. These documents collected from the "official files" of the University of New Mexico and from the personal files of participants proved to be a valuable source of information that provided the researcher with an additional avenue by which to observe how individuals reacted to external events and initiated actions inside the organization. Through informal interviews, the researcher obtained additional, explicit information and "tacit knowledge" (Polyani, 1958) about those pre-verbal understandings of events pertinent to the research effort.

Through this approach, which is described by Smith and Pohland (1972) as a "multi-method, multi-person, multi-situation, multi-variable matrix (p. 11), opportunities became available to follow Iannaccone's (1975) "reiterative cycle" of definition, data collection, analysis and examination of concepts, and subsequent redefinition, as need emerged from the data, generated by this "disciplined inquiry" (Cronbach and Suppes, 1969).

In most qualitative studies, it is common practice to mask the identity of persons and places when developing the descriptive narrative. Rist (1982) notes that masking "becomes difficult as too much data is supplied" (p. 10) about people, events and places. Moreover, a substantial amount of information concerning the background and setting of the study is customarily provided in a credible ethnographic study which would enable a determined individual to identify the research location. The University of New Mexico's involvement in the establishment of a Consortium of Rocky Mountain and High Plains universities, the Western Regional Scientific Laboratory, Inc., and its attempt to manage the Los Alamos Scientific Laboratory, all of which are described and analyzed in this study, are unique. For all

these reasons it was decided, therefore, to retain the identities of persons, places and events with the provisions that the researcher provide the individuals that participated the opportunity to review and comment on the draft of the descriptive narrative in which their names appeared and in which they were quoted. This process of review and comment by the participants also contributed to the study's validity.

Data Analysis

An effort was made to correlate and analyze the data during the collection phase of this study. Categories developed as a result of preliminary studies were coded and examined for a "goodness of fit" (McCall and Simmons, 1969, p. 233), with new data emerging from interviews and documents during the last seven months of the study. These categories were refined through constant comparison (Glaser and Strauss, 1967) between the original definitions and the emerging data.

The process of data collection and analysis was refined, focused and directed through the process of "theoretical sampling" suggested by Glaser and Strauss (1967, p. 45). Preliminary categories were examined and redefined, and new categories and sub-categories were generated and tested throughout the study, and data that supported the emerging concepts were designated. By examining and comparing the contexts and concepts, probable relationships were formulated and examined. Through this process several concepts emerged that were felt to be most applicable in illuminating the phenomena under study and were substantially accounted for in the data. The emergent concepts were then elaborated and ordered in propositional form.

Generation of Theory

The development of "grounded theory," which attempts to explain

how universities develop in the direction of research institutions, was the final outcome of the study. However, the immediate applicability of the theory should be reserved. Grounded theories emerge from limited ranges of data and are limited to contextual ranges of applications. The development of "special theories adequate to limited ranges of social data [rather than] . . . the search for all-inclusive conceptual themes" (Merton, 1957, pp. 9-10) is of paramount importance in this study.

The value of research directed toward developing grounded theory lies not in the validation of existing theory but, rather, in the discovery of new understandings and perceptions. This study does not assert that the grounded theory developed here will reflect the manner in which they will develop in the direction of graduate research institutions. Rather, it is based on the premise that "understanding the response of one institution in one setting may contribute to the fundamental and general understanding of how institutions of higher education respond to their environment and pursue development into research organizations" (Bjork, 1983, pp. 179-180). Although the setting changes from one institution to another, it is suggested that the grounded theoretical framework developed here probably reflects elements that can contribute to a better understanding of how any university interacts with its environment and develops in the direction of a research institution.

Background

The association between science and the federal government is a unique American phenomenon (Veysey, 1963) that has proved to be mutually advantageous: government agencies accomplish their applied research with the assistance of trained university scientists, and

the government's support of science provides a source of strength to the emergence of scientific research in institutions of higher education.

Although reliance on colleges and universities for the performance of applied research began on a modest basis during the latter part of the 19th Century, the pursuit and support of science by the federal government inside universities grew rapidly (Cowley, 1980; Dupree, 1957; Millet, 1952). During the 1930's scholarly and scientific pursuits were recognized as valuable resources in finding solutions to difficult and pressing national economic and social problems. The practice of linking applied science with practical public service developed as a dominant theme in the federal government's rationale for employing and financially supporting university-based research.

The relationship between the federal government and the university research community entered a new era during the 1940's, when both the diversity and scale of research expanded substantially. The federal government accepted the major financial responsibility for the support of scientific research and for establishing a state of mutual dependence (Ashworth, 1972; Kidd, 1959; Price, 1965) with institutions of higher education. The rapid expansion of federal financial support for university-based research, according to Corson (1975) originated in the years just prior to World War II, when the government sought the assistance of highly-skilled faculty researchers.

During and after World War II, federally-sponsored research rapidly became a major campus activity. Federal grants and contracts became the principle means of providing support for scientific research. Federal support for research rapidly overshadowed university resources as the primary means of funding scholarly research activi-

ties (Corson, 1975; Kidd, 1959; Strickland, 1967). An indirect result of this shift in research support from the universities themselves to the federal government shaped the fundamental characteristic of government-university relationships during the post-War period (Dupree, 1957; Murphy, 1971; Orlans, 1968) and enhanced the research capabilities of institutions of higher education. The federal government emerged as the principal sponsor of scientific research, and the universities were recognized as the locus for carrying out government research.

The dramatic increase in federal support for university-based research and development between 1953 and 1968, increasing from \$1.25 million to \$1.9 billion (Smith and Karlesky, 1977, p. 18), had a profound impact on the evolution of established and developing institutions. The literature suggests that federal support stimulated the growth of campus research, shifted institutional emphasis toward graduate education and research training, shaped the direction of research, dominated its continuance, contributed to the emergence of research as a measure of institutional stature and ushered in a new era of political relations between the universities and the federal government (Babbidge, 1968; Ben-David, 1972; Heimovicks, 1971; Kidd, 1959; Klopsteg, 1959; Price, 1965). As a consequence of this unprecedented and massive support, the shape of research in universities and the direction of research institutions were no longer the concern of the academic community alone but emerged as both a matter of public and institutional attention. The literature suggests that as the external research environment became more dynamic, research universities adapted, some rapidly than others, to the new demands by placing an increased emphasis on research.

The Development of the Office of the
Vice President for Research

In the years just prior to 1968, when federal support for research and development in the nation peaked, some faculty members and administrators at the University of New Mexico noted the growing national emphasis being placed on research. During the 1967-1968 period the University was characterized as a "young, maturing institution" (personal interview, Travelstead, July 26, 1982) that was in the nascent stages of development as a research institution. The new administration's emphasis on expanding sponsored faculty research was supported by key faculty members and was viewed as an important vehicle through which the quality of instruction, graduate programs and faculty could be improved and as an important vehicle through which the stature of the institution could be enhanced.

During the 1967-1968 period, the University, in moving toward the establishment of the Office of the Vice President for Research, shifted the manner in which it viewed itself internally and the way in which it wanted to be viewed externally. It was a significant shift and a symbolic step in the direction of the maturation of the institution.

The decision to move the institution into the mainstream of academic life by expanding campus research led, in 1967, to the decision to establish the Office of the Vice President for Research. This decision was made by President-elect Heady in consultation with other key administrators and faculty members and was implemented shortly after he became president in 1968. During the 1968-1972 period, under the direction of President Heady, the role of the Office of the Vice President for Research was defined, accepted by the University community and institutionalized.

The administration recognized that it would have to provide more than a symbolic gesture to move the institution in the direction of a graduate research university. The administration became an effective advocate for research on and off campus. It convinced the New Mexico State Legislature to approve measures that would retain 80% of the overhead charged to grants and contracts to be redistributed for the support of research activities and reduce teaching loads for faculty researchers. The institution moved to link research and publication formally to faculty promotion and tenure. The image of the institution as a research university was enhanced by the increased visibility provided by the Vice President for Research formally representing the University at important local, state and national meetings and policy briefings.

Dr. Paul Silverman was appointed Vice President for Research in 1973 and initiated vigorous efforts to restructure and focus the activities of the Office on securing research support and enhancing faculty research services. Dr. Silverman observed that Dr. Heady "gave me more opportunity to devote more time to encouraging research and development . . . establishing relationships both within the campus . . . and going out and selling the potential of the institution not only at the federal scene" (personal interview, Silverman, March 24, 1982), but at the state level as well.

The Development of External Research Support

By 1974, Dr. Heady's goal of obtaining increased research funding for the University from outside sources began to be realized. During the 1972-1975 period, when federal funds for university research became relatively static, the institution began to move

more aggressively in developing its research capabilities.

"[W]hen a lot of [universities in the nation] were retrenching, the University of New Mexico was going externally, it was in a marketing . . . entrepreneurial mode" (personal interview, Kasner, May 20, 1982). The data support this impression. For example, the number of proposals submitted by faculty increased 46% between June 1971-June 1975, from 284 proposals to 612 proposals. The University's expenditure of research, development, and demonstration funds, during this period, increased (in constant 1972 dollars) nearly 25% from \$7.7 million to \$9.6 million. In 1972, for the first time, the University was listed (54th) by the National Science Foundation in its "Total Federal Obligations to 100 Universities and Colleges Receiving the Largest Amounts, FY 1972." The University remained on that listing throughout the remaining period studied.

The Vice President for Research and the Director of Research and Fellowship Services, Edmund B. Kasner, engaged in an aggressive program of gathering and distributing pertinent information on research opportunities and providing a wide variety of other types of support services for faculty. In addition, the Office of Research and Fellowship Services identified shifts in federal funding policy to assist both the Vice President for Research and research faculty in adjusting strategies and taking appropriate action to secure support.

The federal government was accurately viewed by the University as the major source of research support and was the principal focus of the institution's initiatives in aggressively pursuing

research dollars. Dr. Silverman, as part of the new research-development program, began to increase the visibility of the University's research potential by increasing contacts with administrators in federal agencies and among members of the State's Congressional delegation.

After the 1973 Arab oil embargo, interest in energy-resource development increased substantially in New Mexico. The University participated in an intra-state research development plan to apply the research development plan to apply the research capabilities of New Mexico universities to the national energy crisis. According to Silverman,

We convinced [Governor] Apodaca, at that time, to use some of the severance tax money to set up our own state [research] capacity so we could build up our [university] . . . in a way that would increase our visibility. We provided information, we provided programmatic goals that were politically useful and . . . meaningful. When we [received] federal funds for [research], we made sure that the political representatives and others were well-aware of what we were trying to do. It was a matter of communication and information (personal interview, Silverman, March 24, 1982).

Regional Inter-institutional Cooperation

During 1972-1975, when the University was establishing itself as a more aggressive research institution, it began to affiliate itself informally with other Rocky Mountain and High Plains universities that shared common research interests. In 1975, this group became an informal association of university vice presidents called the Intermountain University Research Administrators (IMURA). The nineteen institutions cooperated in several areas: to strengthen the relationships between federal agencies and regional universities; to exchange information concerning federal

research policy and research opportunities; to improve their respective competitive positions in securing federal research funds, and to influence Congressional delegations and federal agencies to support budget increases and programs affecting the region's university based research.

Among the several areas of concern that formed the basis for cooperation among these regional universities was the developing federal research-agenda that resulted from the 1973 Arab oil embargo. Dr. Silverman observed a number of developments that indicated that the federal government was depending on institutions in regions that were well supplied and connected with the Washington establishment. The institutions in the Rocky Mountain region were considered to be in the "hinterland" with a limited political constituency and in terms of its Washington connections.

The 1973 Arab oil embargo focused attention on the Rocky Mountain region's natural wealth as well as on the impact that would come with massive extraction efforts. With national energy-investment and government interests turning to this area, IMURA became more active and more mutually supportive. The Energy Research and Development Act of 1974 underlined the importance of the Rocky Mountain region in establishing the nation's energy independence. The emerging competition for those funds underscored the disadvantages regional universities had in competing for research funds against established research universities on the East and West coasts.

There was a general agreement on directions in research development among the members of IMURA because the majority of the institutions represented were in similar stages of institutional

development, particularly with respect to research: most were in competitive, entrepreneurial modes. The coincidence of views emerged as a strong feeling that whatever IMURA could do to generate more research in the region would benefit their respective institutions. In a unique spirit of cooperation, those institutions that were in competition for research support also collaborated to improve their collective competitive positions in pursuit of federal research support. Dr. Silverman observed that this group "had a sense of a larger game that was being played [and] felt . . . that if we did not cooperate with some reasonableness, we didn't stand a chance in the competition" (personal interview, Silverman, March 24, 1982). Thus the focus of the IMURA group was competition on a national scale for access to resources at a regional level.

The IMURA group saw most of the federal resources for support of research being divided between the West and East coasts. Members felt that to protect their interests in securing research support, they would have to increase the visibility of regional research capabilities and bring collective pressures to bear to ensure that the federal division of research support would include grants to universities in the Rocky Mountain States.

The Energy Research and Development Administration (ERDA) was created by the Energy Reorganization Act of 1974 and came into existence in January 1975. ERDA's mission effectively translated into a substantial energy research and development effort. In June 1975, ERDA published its National Plan for Energy Development and Demonstration--ERDA 48, which indicated that ERDA would contract for a substantial number of research programs, encourage joint

research and development projects, including the management of government facilities, coordinate energy research and development efforts with the private sector and with universities, and solicit planning assistance from regional groups (ERDA, 1975). Following the publication of its national plan, ERDA convened a two-day meeting in November, 1975, to solicit university participation in its research efforts. At this conference, Dr. Robert Seamans, Jr., ERDA Administrator, said that ERDA [would] deal with the universities as professional partners in the overall national energy research and development effort" (A Summary: Western Universities Propose to Manage Los Alamos Scientific Laboratory," UNM, 1977, p. 5).

According to Dr. Silverman, Dr. Seamans' statement was viewed at the University of New Mexico as an indication that universities would play an important part in ERDA's effort to pursue the goal of energy independence for the nation.

ERDA Research and University Competition with the
Los Alamos Scientific Laboratory

The Los Alamos Scientific Laboratory (LASL) took an active interest in participating in ERDA's emerging research and development program. During the post-1973 Arab oil embargo period especially during the years following the establishment of ERDA (1975-76) Los Alamos "had an active public-relations effort . . . to both make the Laboratory appear as [an] energy laboratory . . . and to give a regional tone to it" (Personal interview), Jenkins, July 16, 1982). The data suggest that LASL saw and took the

opportunity of altering the mix of what it was doing from nuclear weapons to peacetime kinds of research. Dr. Harold Agnew, Director of the Los Alamos Scientific Laboratory, indicated that LASL was making a significant shift from nuclear weapons to energy research and hoped to become "a vital facility . . . a World Center for research and development aimed at solving the energy problem" (Albuquerque Journal, June 11, 1973, p. B-2).

Dr. Silverman became concerned that "Sandia and Los Alamos [Scientific Laboratories] were beginning to move . . . into all the areas that previously they did not engage and which have been very largely the areas in which we, at the University, were competing. That was our major problem" (Personal interview, Silverman, March 24, 1982). Dr. Silverman was concerned with the implications of LASL's emergence as an energy research laboratory, LASL's competition with the University for research support, its proselytizing of University faculty researchers, and the resulting reduction of the institution's capacity to compete effectively in certain research areas became important concerns.

However, encouraged by ERDA's initial policy statements, they began to work toward establishing formal relationships with ERDA to participate directly in its research programs. In December 1975, a number of IMURA members were invited to ERDA's Washington headquarters to discuss a number of possible regional university relationships that could be established among ERDA, universities, and coordinating agencies. In this meeting Dr. Seamans stated:

Universities can, indeed, play an important role for public sector policy makers and for the general public in providing a strong technical base for energy research

and development. It is, therefore, my hope and expectation . . . that we will see increased ties between the agency and our colleges and universities in . . . energy research ("ERDA-University Conference Proceedings," ERDA, December, 1975, p. iii).

However, following that meeting Dr. Silverman met with the head of the National Science Foundation that indicated the thrust of ERDA's relations with "colleges and universities" were the prestigious, established research universities located on the East and West coasts. The uncertainty about the role of the Rocky Mountain universities in participating in ERDA's energy research program coupled with LASL's move into a competitive position with the regional universities foreshadowed a far more reduced participation than regional universities administrators initially expected.

It became increasingly evident that ERDA would rely most heavily on its existing system of national laboratories to get its program for energy self-sufficiency moving. ERDA was under pressure to get immediate results in achieving energy self-sufficiency, knew the capabilities and had confidence in the past performances of its laboratories. "They had a known entity they felt could produce on a short-term work schedule" (Personal interview, Grant, August 17, 1982). "They really had no alternative" (Personal interview, Jenkins, July 16, 1982).

IMURA held its March, 1976 meeting at the University of New Mexico and discussed university participation in energy research. These discussions, with ERDA representatives in attendance, included the possibility of turning over the management of LASL to a consortium of regional universities when the contract came up for renewal in 1977. The fact that LASL had "described itself

as a regional energy laboratory . . . [and had] 55% to 56% of [its] budget in non-defense related work" (Personal interview, Silverman, March 24, 1982) established a base of interest among members of IMURA to seek the management contract for LASL and cooperate as a group in the same way Argonne Laboratories, Oak Ridge and Brookhaven National Laboratories were governed by consortia of institutions. Kasner noted that there seemed to be a consensus among the members of MURA to support a management proposal effort.

On May 17, 1976, ERDA held a Western regional meeting in Denver, Colorado. The meeting included representatives of regional universities and energy coordinating agencies. During a meeting between several university representatives and ERDA, administrators indicated that a review of the LASL-University of California contract was in progress and that "there was still time for the universities to submit a competing proposal (to manage LASL) if they acted quickly" ("Synopses of the LASL Management Project," UNM, 1976, p. 4). A significant development within ERDA was discussed during the May 17, 1976, meeting that suggested the direction ERDA would take in pursuit of its future research program. LASL, with ERDA's support, presented a proposal that it become a regional energy laboratory that would manage the administrative and fiscal aspects and provide direction for ERDA's regional energy-research program. The regional research universities objected to LASL's circumscribing their involvement in regional energy research by managing ERDA's research programs and substituting an administrative support unit that would replace the competitive peer-review process. The expectations of the regional research universities

had been substantially diminished since the November and December 1975 meetings with Dr. Seamans, Jr., at ERDA offices in Washington, D.C., and now LASL's emergence as ERDA's regional energy laboratory and its control of regional energy research caused concern within the IMURA group. By mutual agreement of IMURA members, Dr. Silverman was to direct the group's LASL management proposal and undertake the formation of a consortium of Rocky Mountain and High Plains universities, and the Western Regional Scientific Laboratory, Inc.

On June 25, 1976. Dr. Silverman wrote to Dr. Seamans, ERDA Administrator, stating that,

"the University of New Mexico, in association with a regional consortium of Rocky Mountain and High Plains universities, intends to submit a proposal to the Energy Research and Development Administration to undertake the contract management of the Los Alamos Scientific Laboratory" (Silverman to Seamans, June 25, 1976).

Copies of this letter were sent to ERDA and LASL officials, IMURA, the New Mexico Congressional Delegation, the Governor of New Mexico, and key administrators in the University of New Mexico.

In July, 1976, the University of New Mexico allocated \$50,000 for the purpose of preparing the management proposal to be submitted by a consortium of universities designated as the Western Regional Scientific Laboratory, Inc. A project director and staff were employed and the proposal effort was begun.

On August 5, 1976, Dr. Seamans wrote Dr. Davis, President of the University of New Mexico, to inform him that ERDA's consideration of the extension of the contract for management of LASL had been completed. He stated that his approval of opening negotiations with the University of California,

"was based on consideration of all circumstances surrounding the contract, including the . . . universities' interest in . . . the study of energy problems (and which he considered) as not appropriate to LASL's primary mission . . . research, development, and testing for ERDA's nuclear weapons program" (Seamans to Davis, August 5, 1982).

Dr. Seamans' decision to open negotiations with the University of California was made approximately seven months ahead of the schedule previously discussed with top ERDA officials in June, 1976.

Dr. Seamans' letter raised some rather basic questions about ERDA's intent to rely on universities to find solutions to national energy problems. These universities believed that ERDA's position not to consider their proposal to manage LASL was in direct contradiction to ERDA's policy on the desirability of substantial interaction with universities and believed that Dr. Seamans should reverse his decision to open negotiations with the University of California. In addition, the Rocky Mountain universities believed there were sufficient indications that LASL would increase its participation in energy research and emerge as a substantial competitor for federal research support.

The day after Dr. Seamans wrote his letter to President Davis, on August 6, 1976, the IMURA group met at the University of Montana at Missoula to draft a proposal for the formation of a consortium of universities in the Rocky Mountain and High Plains region. The purpose of this consortium, the Western Regional Scientific Laboratory, Inc., was to manage the Los Alamos Scientific Laboratory. The response by most members of IMURA to the proposal plan and forming a consortium was favorable. Although some of the member institutions preferred not to join the consortium, opposition to the

effort did not emerge. There was a general consensus that the consortium could develop a role "in the energy-related research and energy related liaison activities in the region . . . and materially assist the regional universities in competing for energy research work" (Jenkins, "Desk Log," 1976, p. 2).

In response to ERDA's refusal to consider the consortium's proposal and decision to initiate negotiations with the University of California for the LASL management contract, the consortium initiated a concerted political effort to intervene in the negotiation process. Meetings were held with influential Congressional delegations, ERDA administrators, and an attempt was made to initiate Congressional hearings into the ERDA-University of California contract procurement procedures. However, the approach of the national elections in the fall of 1976, the impending resignation of Dr. Seamans as ERDA Administrator, and changes in the committee system of the United States Senate compromised the effectiveness of the consortium's efforts to bring political pressure on ERDA.

Concurrent with the political intervention efforts the proposal preparation and consortium formation efforts continued. Twelve institutions in the Rocky Mountain and High Plains regions expressed an interest in becoming members of the consortium. Membership agreements and articles of incorporation were prepared and preliminary drafts of the management proposal were reviewed by prospective members.

During early December ERDA had taken a conciliatory position and indicated its desire to explore possible, but limited, working

arrangements with the universities. However, later that month ERDA administrators disavowed any intent to consider the consortium management of LASL. That was a reversal of an earlier position taken by ERDA officials. In this climate of uncertainty the consortium took the initiative to finalize the articles of incorporation and the bylaws. The Western Regional Scientific Laboratory, Inc., was incorporated in the State of New Mexico during January, 1977. Its charter members included the Colorado School of Mines, Colorado State University, the University of Denver, New Mexico State University, The University of Colorado, the University of Nebraska-Lincoln, The University of New Mexico, The University of Utah, Utah State University, and the University of Wyoming.

ERDA held a one-day briefing session for the presidents of the regional universities at LASL on January 31, 1977. During this meeting ERDA unequivocally stated that LASL was and would remain primarily a nuclear weapons laboratory and would only engage in non-weapon work to the extent that it would not interfere with its primary mission. They represented the non-weapon work as 40% of the budget with only 1% designated for what LASL categorized as regional energy studies. This information contradicted both LASL's and ERDA's previously-published statistics as well as those of the University of California's official 1976 investigating committee. It was quite clear to the regional universities that there would not be any change in LASL programs or management that would provide for more direct participation by regional universities. The universities, rather than being satisfied that LASL would withdraw its plans for extensive energy research, felt that the level of

competition for research hegemony between the universities and the Laboratory increased. As a result the level of inter-institutional cooperation grew among members of IMURA.

The data indicate that during the spring of 1977 the bylaws of the WRSL, Inc., were revised, the Board of Directors approved a motion to submit the consortium's management-proposal to ERDA and continued their political action efforts. On March 24, 1977, Dr. Silverman received a letter from General Starbird, ERDA Assistant Administrator for National Security, along with the unopened proposal. He indicated that a decision had been made on August 5, 1976, to re-negotiate the LASL management contract with the University of California and that the contract extension had already been signed for an additional five year period. He also encouraged the consortium to continue "discussions with Dr. Eric Willis on the broader questions of regional research and development and the role your institution [UNM] can play" (Starbird to Silverman, March 24, 1977). The WRSL, Inc., response to this letter of refusal indicated that it intended to examine alternative arrangements to involve the regional institutions in ERDA's regional research program.

During the April meeting of the Board of Directors of WRSL, Inc., an alternative proposal for the consortium to serve as a service organization for both the regional universities and ERDA. The proposal called for the collection and organization of information on the capabilities of regional universities to perform research for ERDA. Although ERDA expressed an interest in establishing a relationship with the consortium as outlined in the

proposal. During this and subsequent meetings held during late spring and summer a more definitive proposal was prepared, in consultation with ERDA administrators, and was submitted during late August, 1977. On November 11, 1977, the status of the proposal was discussed with Mr. Richard Stephens, Acting Director of the Office of University Programs of the Department of Energy. However, by December it became evident that the proposal was caught in limbo because of the reorganization efforts underway as a result of the restructuring of ERDA as a cabinet-level Department of Energy. The proposal was considered in January, 1978 and was formally rejected in February. It was the victim of bad timing and bureaucratic organizational problems" (Meyer, Minutes of the Board of Directors, WRSL, Inc., April 13, 1978).

During the spring of 1978 the effects of the consortium's attempt to manage LASL and its persistence in seeking a role in regional energy research became evident. The data suggests that the persistence of IMURA and the consortium had a significant impact on ERDA/DOE's plans to make LASL a regional energy laboratory. ERDA/DOE confirmed that LASL would remain primarily a nuclear weapon facility. This policy decision effectively prevented LASL from becoming a substantial competitor to regional universities for energy research support, ERDA also dropped its plans to designate LASL as a regional project-reviewer that had the potential of controlling energy research in the region. Thus, LASL's threat as a direct competitor to regional universities diminished substantially and the acquisition of energy research support continued as it had in the past, through a traditional agency peer-review process.

In view of these changed circumstances the consortium was dissolved during April, 1978. The IMURA group continued to cooperate on the basis of exchanging information concerning federal research policies and opportunities, strengthening relations with federal agencies, improving their respective competitive positions in securing federal research funds, and to influence Congressional delegations and federal agencies to support budget increases and programs affecting the region's university based research.

Analysis

By definition, inter-organizational cooperation in higher education involves an arrangement between two or more institutions through which mutual benefits are derived. Inter-organizational cooperation appears to be one means utilized by institutions to adjust to shifts in their external environments.

An overview of the literature on inter-organizational cooperation suggests that this phenomenon is most likely to occur when institutions experience environmental changes that compel them to act in their own interests (Aiken and Hage, 1968; Anderson, 1964; Carnegie Commission, 1972; Foster, 1982; Gallegher, 1982; Havighurst, 1967; Howard, 1957; Nyquist, 1967).

Universities faced with a changing environment may adapt through existing structures, undergo structural change, or incorporate part of the external environment. The differentiated organizational framework characteristic of universities allows critical functions to be performed by organizational sub-systems

and enables them to segment their external environment and develop adaptive strategies for coping with each segment of the environment separately without disrupting the work of the other subsystems (Glassman, 1973; Granovetter, 1973; Ikenberry and Friedman, 1972; Schmidt and Kockan, 1977; Simon, 1969; Thompson, 1967; Whetten, 1981). Adapting to environmental change may stimulate cooperation rather than competition; universities may combine into larger systems such as consortia (Evan, 1966; Griffith, 1964).

The literature concerning inter-organizational cooperation as an adaptive mechanism through which institutions of higher education adapt to environmental change is useful. A review of the specialized literature suggests that mutual adjustment typifies inter-organizational relationships that occur in a competitive environment. The organizations involved have few shared, long-term goals; the goals that do emerge are instead temporary. The level of coordination tends to be informal and specifically focused. Institutional representatives tend to be administrators who establish ad hoc, informal inter-personal relations. The benefits derived from this type of inter-organizational relationship are narrow and generally involve little cost (Haas and Drabek, 1973; Lehman, 1975; Warren, 1967).

"Alliance" (Whetten, 1981) as a form of inter-organizational cooperation is intermediate between "mutual adjustment" and "corporate structure." The alliance form represents an increase in the level of intensity of inter-organizational cooperation. Efforts in an alliance relationship are directed toward coordinating

autonomous organizations without the use of a formal hierarchy. Alliances do not establish central administrative units, are specifically focused, do not impinge upon the members' ability to act independently, are ad hoc with respect to rules and procedures, are often modified, and have little regulatory power (Aiken and Dewar, 1975; Clark, 1965; Mott, 1968; Warren, 1967).

Whetten (1981) indicates that the corporate type of inter-organizational coordination is associated with the creation of formal structures. Activities are coordinated by a central agency that attempts to accomplish specific goals established by the participating organizations. Control is legitimated by collective decisions and goals are pursued through an agreed-upon plan.

In the specific case of the University of New Mexico, beginning in 1972, representatives of the University informally met with other Rocky Mountain and High Plains universities to share information concerning specific federal research support opportunities and to discuss common research interests. The data suggest that the University adapted to change in its external research support environment by increasing the flow of strategic information about the environment through increased frequency of contacts with other regional research universities.

In response to a competitive environment, the University joined with eighteen other regional universities in establishing an informal, ad hoc group, IMURA, that addressed specific issues, exchanged information, and aided member-institutions in adjusting to shifts in their respective and common research support environments.

After the 1973 Arab oil embargo made energy RD&D in the region seem a likely research possibility, the University increased its level of inter-organizational activity in IMURA. This increased activity focused on the region's energy resources and raised the hopes of the University and other IMURA members that the Energy Research and Development Administration (ERDA) would provide them with energy research funds and projects. The perceived increase in federally-supported energy research stimulated an increase in competition for resources among institutions within the State and among regional institutions. Increased competition was also anticipated from established research universities on the East and West coasts and from the Los Alamos Scientific Laboratory. Although ERDA initially indicated that it would leave a large measure of the responsibility for research activities to the regional universities, mixed signals about ERDA's energy-research program and the universities' participation in it were apparent. The University became concerned throughout the 1974-1976 period, when the Los Alamos Scientific Laboratory (LASL) appeared to be shifting its emphasis from nuclear weapons-research to energy research. LASL's direct access to ERDA research support via the "Form 189 route," its proselytization of University research faculty, and its apparent emergence as a regional energy laboratory caused the University to increase its participation in IMURA activities. The likelihood of mutually supportive institutions succeeding in this newly-competitive environment was the impetus for the University's new level of inter-organizational cooperation.

The emergence of an "alliance" type of inter-organizational relationship was the result of two significant events that occurred at an IMURA meeting in Denver on May 17, 1976. At that meeting, ERDA supported LASL's proposal to become a regional energy laboratory and invited members of IMURA to bid on the LASL management proposal schedules for renewal in 1977. These events heightened the University's sense of increased competition and increased the intensity of its participation in IMURA activities. An alliance was formed by some members of IMURA shortly after the May 17, 1976, meeting for the purpose of preparing a proposal and forming a consortium to manage LASL. Dr. Paul Silverman was authorized to head the proposal and consortium development effort. Decisions that provided direction to the proposal effort were initially made by consultation with members of the consortium rather than by formal agreement. The goal of the University's participation in this alliance appears to have been to protect its own interests in securing federal energy research support.

Participating universities initially agreed to support the proposal effort informally and not to incorporate the consortium, Western Regional Scientific Laboratory (WRS�), until ERDA gave some positive indication that the proposal to manage LASL was acceptable. At such time, the group intended to incorporate formally. However, when ERDA learned that the universities were pursuing the proposal effort in earnest, the agency accelerated its contract review with the University of California and awarded the renewal contract well in advance of the previously-announced date. Shortly after ERDA took this action, the universities

incorporated formally. The data indicate that the group intended the corporation not only as a vehicle through which it could submit the proposal, but also as the vehicle through which it could present its case to ERDA, Congressional delegations, and the public.

Several factors appear to have contributed to the University's interest in moving toward a corporate type of inter-organizational relationship and to its preparing the LASL management proposal. First, the University concurred with other members of IMURA that if political efforts were mounted by their combined Congressional delegations, a review of the LASL contract-award procedures might lead to a reversal of the award decision. Second, ERDA took a conciliatory position toward the future WRSI, Inc., activities in its regional energy research program. Third, on several occasions, the Regents of the University of California came within a narrow margin of discontinuing the management of LASL. Fourth, in 1977, an investigation by the University of California's Gerberding Committee found that the University had little to do with the management of LASL and that it was not substantially involved in the laboratory's research programs. Fifth, the successful efforts of the Argonne Associated Universities in managing the Argonne National Laboratory from the University of Chicago indicated that persistent efforts by a formal university corporation could influence a powerful federal agency (at that time, the Atomic Energy Commission) to yield (Jenkins, "Desk Log," 1976).

In sum, the University's association with IMURA between 1972-1978 appeared to be a response to the level of competition in its external environment.

The University's inter-organizational cooperative activities with IMURA were part of its adjustment to changes in its external research support environment. It appears that as the level of uncertainty in the environment increased, the University's level of participation in inter-institutional activities also increased. The University shifted from mutual adjustment to alliance and finally to a formal, corporate form of relationship as it perceived the level of competition for energy research support increase. The data on the inter-institutional cooperative relationship between the University and IMURA during a period of increasing competition in its external research support environment suggest the following propositions:

- 1.0 The greater the degree of change in a university's external environment, the greater the probability of inter-institutional cooperation.
- 1.1 The greater the threat to a university's research funding, the greater the degree of inter-institutional cooperation.

Toward a Theory of Inter-organizational Cooperation
in Developing Research Universities

Zetterberg (1965) notes that to ask for an explanation of a phenomenon is to ask for a theory. The proposition suggested by the data that are related to the phenomenon of the emergence of the University of New Mexico as a graduate research institution is a review of what has been learned about inter-organizational cooperation from this unique study of a single institution. Inter-organizational cooperation is a "determinant" (Zetterberg, 1965), and its corresponding properties emerged from the data.

A limited but "grounded" theoretical explanation (Glaser and Strauss, 1967) of the phenomenon of the development of the University in the direction of a graduate research university is presented as a statement that concludes the analysis and can be summarized thus:

The development of an undergraduate teaching institution in the direction of a graduate research university is partially explained as a function of the degree of effort toward and success at inter-organizational cooperation.

Significance of the Study

Organizations are social inventions that are both fluid and dynamic. They move in time and space, act and react, and are shaped by a combination of external and internal environmental factors that both threaten survival and provide impetus for modification. The manner in which environmental influences affect organizations and the adaptive mechanisms utilized by University leaders are important foci for organizational research.

This ethnohistorical study of the University of New Mexico is unique in both setting and purpose. It represents the first ethnohistorical effort to examine contextually inter-organizational cooperation as a factor associated with the development of a graduate research university at a time when federal funding for research support remained at a relatively static level. This study provides a contextually rich historical description of a variety of forces that influenced some members of the faculty and administration of the University of New Mexico to take a particular course of action that shaped the future character of the institution.

It is hoped that any conclusions drawn from this research effort will contribute to the ability of universities to understand the forces that are associated with the emergence of research institutions. At the very least, it is hoped that this study will contribute to the literature on how universities adapt to changes in their external research support environment and the utilization of inter-organizational cooperation as a mechanism associated with the development of research universities.

The value of qualitative research rests in the discovery of new understandings and insights into the development of grounded theory. Although this paper does not assert that the grounded theory developed here will reflect the manner in which all institutions adapt to external changes and develop in the direction of graduate research institutions, it does, however, advance the premise that understanding the response of one institution may contribute to both fundamental and general understandings of how similar universities respond to similar changes and needs in their environments. Although the propositions developed here are contextually limited to this study, they have raised questions for further research into this phenomenon.

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